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COLONY OF THE GAMBIA.

THE ANNUAL REPORT

OF THE

DEPARTMENT OF AGRICULTURE

FOR THE YEAR ENDED MARCH 31st, 1932.

Price 3/-

BATHURST:
PRINTED BY THE GOVERNMENT PRINTER.

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DEPARTMENT OF AGRICULTURE.

ANNUAL REPORT

ON THE

AGRICULTURAL DEPARTMENT

FOR THE YEAR ENDED MARCH 31ST, 1932.

STAFF CHANGES.

The Director proceeded on leave on 19th August and returned to the Colony on 11th December. During his absence the duties of Acting Director were performed by Mr. J. Pirie, Agricultural Superintendent.

Mr. F. W. Hall, Assistant Director proceeded on leave on 20th April and resumed his duties on 11th December.

Mr. J. Pirie who proceeded on leave on 21st March, 1930 proceeded to India and Ceylon at the expiration of his leave, to study irrigation, and returned to the Colony on 21st May, 1931.

Mr. T. R. Hayes returned from leave on 16th April, 1931 and was transferred to Uganda in January 1932.

Mr. J. W. Sparrow proceeded on leave on 21st December.

Agricultural Overseers and Produce Inspectors – The following officers were retrenched during the year:— Messrs D. Forbes, Surey Jallow and Secku Camara.

Mr. Saide Gaye, Caretaker, MacCarthy Square, retired during the year upon reaching the age limit.

GROUNDNUTS.

In view of the considerable drop in the market value of groundnuts during the previous year, the area under this cultivation was greatly reduced during the year under review. The prices paid—3*d* to 10½*d* per bushel of 28 lbs. —rendered groundnut cultivation unprofitable, with the result that greater attention was paid during the year to the cultivation of foodstuffs. The crop purchased was 37,627 tons, this being 27,917 tons less than the previous year.

The annual exports for the last five years were as follows:—

YEAR.		TONS.	VALUE.
Grown.	Exported.		£
1927	1928	74,442	1,092,790
1928	1929	56,355	765,564
1929	1930	74,761	867,634
1930	1931	66,811	506,125
1931	1932	*37,627	—

*Actually purchased but not yet exported.

The prices paid during the season were considerably in advance of those paid the previous year and opened in December at 1*s.* ½*d.* per bushel. By February 2*s.* 10½*d.* per bushel was being paid ; a slight drop to 2*s.* 6*d.* then occurred and this price continued until the end of the season 31st March, 1932.

This material rise in price has had a stimulating effect upon the farmers and considerable areas in excess of last season are being cleared and prepared for cultivation of groundnuts in June. Given an adequate supply of seed there is every reason to expect a record crop in December.

Province.	Groundnuts Tons 1930/31.	Groundnuts Tons 1931/32.
Upper River	23,130	13,687
South Bank	17,562	7,414
MacCarthy Island ...	16,563	9,442
North Bank	8,289	7,084
	65,544	37,627

Groundnuts Seed Supply Scheme.

This scheme which was approved by the Secretary of State in 1926 has now been running for five years and a review of its work will be of general interest. The objects of this scheme were to guarantee sufficient seed being reserved each year to raise 40,000 tons of groundnuts and to build up a Reserve Fund from which seed would be purchased and issued to the farmers each year, and thereby make them independent of Government financial assistance, and so safeguard the Government against financial loss through the inability of the farmers to repay the cost of the seed.

To start this scheme it was necessary to borrow money from Government to purchase the seednuts and bags in the first instance.

Interest was paid to Government at the rate of 5 per cent on all money borrowed.

By 31st December, 1929, the whole of the borrowed money had been repaid to Government and a "Reserve Fund" of £6,483 13*s.* 7*d.* established. This scheme therefore became self-supporting within three years.

Previous to the inception of this scheme the Government in 1924 had been forced to write off the sum of £33,481 being the cost of groundnut seed and rice issued to the farmers and which they found they were unable to repay.

In 1921/2 the total groundnut crop was 63,000 tons and this dropped to 46,583 tons in 1924/5. The sole cause of this decline was the heavy debt incurred by the farmers for rice and seednuts. Their attitude being that the Government would take all their groundnuts to pay off the debt and they would therefore have to go hungry whether they worked or not and it was therefore better not to work.

This scheme was then drawn up and approved and the debt written off. The effect of this upon the succeeding crops and the number of Strange Farmers coming into this Colony from French Senegal to grow groundnuts is clearly shown as follows:

The sudden drop in 1931 is due largely to the fact that the local price for groundnuts in 1930/31 dropped as low as 3*d* per bushel and owing to the presence of large swarms of locusts the farmers were urged to concentrate upon the cultivation of foodstuffs rather than upon groundnut cultivation.

Year.	Seed Distributed (Bushel Bags)	Crop Produced.	Strange Farmers.
1926	5,800	65,107	13,553
1927	14,095	74,442	17,237
1928	17,041	56,355	20,640
1929	20,209	74,761	18,874
1930	9,361	66,811	16,592
1931	400	*37,627	9,736

*Actually purchased in 1932 but not exported.

The average annual crop of groundnuts for the 5 years immediately preceeding this scheme was 57,855 tons. The average annual crop for the 5 years since the operation of this scheme has been 65,200, an average annual increase of 7,345 tons and this increase was maintained notwithstanding the falling market value of groundnuts, and this is an important point.

The export duty during this period was £1 per ton, this represents a direct increase in revenue to Government of £36,725 during the five years operation and no expenditure was incurred in the collection of this amount. The whole sum being therefore clear profit to Government.

In addition the Government has derived direct revenue from increased import duties due to the increased sale of cotton and similar goods. The average price paid locally for groundnuts during the period under review was £8 13*s* 4*d*. per ton this average annual increase of 7,345 tons at this price was therefore the direct means of putting into general circulation among the farmers an extra sum of no less than £63,656 13*s*. 4*d*. and thereby increased their spending power by this amount each year. The Government has further materially benefitted by this general increase in trade as it secured more revenue to the Government Marine Department in conveying passengers and increased freight up and down the river.

A sum of £261 16*s*. 5*d*. has been paid to this Department from the Reserve Fund as freight on seed nuts, but what is more important still since the inception of this scheme the Government has not incurred one penny expenditure in connection with this seed issue.

In addition to these advantages seednuts to the total value of £6,467 11*s*. 2*d*. were distributed free to farmers from the Reserve Fund when owing to the recent abnormal trade depression they were unable to pay for seednuts, and thus secured an average crop.

The Reserve Fund as at 31st December, 1931, stands as follows:—

SEED NUTS DISTRIBUTION SCHEME AS AT 31ST DECEMBER, 1931.

RESERVE FUND.

LIABILITIES

Particulars.	Amount.	Particulars.	Amount.
	£ s. d.		£ s. d.
Balance at 31st December, 1931	4,222 17 7	Balance of Reserve Fund at 31st December (Including Interest)	3,476 4 3
		Value of Bags in Stock (12,800 bags at 1*s.* 2*d*) ...	746 13 4
	£4,222 17 7		£4,222 17 7

A change of seed is often desirable and in certain districts between Kaur, Kuntaur and Georgetown, it is most desirable that the seed should be changed each year. The best Gambia groundnuts are grown in the Bintang district of the lower river, and the operation of this scheme has enabled Kaur, Kuntaur and Georgetown districts to be supplied with seednuts each year from the Bintang area. From the foregoing it will therefore be seen that this scheme has proved an unqualified success.

STRANGE FARMERS.

It is with much regret that I have to record a serious drop in the number of Strange Farmers coming into the Colony to grow groundnuts. The total number recorded for the year under review being only 9,736 as compared with 16,592 for the previous year. This figure is 8,925 below the average for the last fifteen years. In 1918 they totalled 24,440.

In my report for 1924 I wrote as follows:— "Their importance can hardly be over-estimated, as there is not the slightest doubt that upon the labours of these farmers depend in no uncertain measure the material prosperity of the Gambia. Their presence make all the difference between a good or bad year, both in respect to the crop of groundnuts grown, and to the general trade in cotton piece goods. Before returning home these farmers convert about half of their earnings into cotten piece goods which they trade with over the border. This heavy drop in their numbers is a serious economic loss both directly and indirectly to the revenue of the Colony.

FOOD CROPS.

Rice:—Swamp rice proved a failure in most districts owing to the rainfall being considerably below the average.

Cereals:—Bumper crops of guinea corn, maize and millets were harvested throughout the Protectorate and this made good the shortage in rice.

Root Crops:—Owing to locust invasions farmers were advised to extend their cassava and sweet potato cultivation with the result that heavy crops are being reaped particularly throughout the Kombo.

The improved varieties of sweet potatoes introduced from Barbados in 1930 have given excellent results and 15,000 vines were distributed from our nurseries in the Kombo last season.

Palm Kernels.

There was an increase of 222 tons in the export of Palm Kernels over the previous year. The export for the last five years were as follows:—

Year.	Tons.
1927	719
1928	615
1929	735
1930	606
1931	828

Produce Inspection.

The progress made in this work is strikingly shown by the material reduction in the number of inspectors which it has been possible to make during the last few years without seriously affecting the standard of purity of the groundnuts exported. In 1924 twenty-four African Inspectors were employed of whom six were 3rd Grade. This service is now being successfully carried on by four African Inspectors only one of whom is drawing 3rd Grade salary.

This satisfactory result has only been made possible by the co-operation of the farmers and merchants with this Department in its efforts to ensure clean produce. Each year sees a reduction in the total quantity of groundnuts which have to be re-screened before export and during the year under review—for the first time on record—there have been no complaints in connexion with this service. The following official analyses recently received of four Gambia cargoes reaching Europe between 17th February and 15th March, 1932, show the satisfactory state of the crop and the effecient system of Produce Inspector. The average percentage of adulteration only exceeds the 2 per cent allowed by the trade by .281 per cent.

	17th February.	1st March.	3rd March.	15th March.
Dust	0.474	0.449	0.571	0.525
Foreign Matter	0.772	0.739	0.757	0.600
Empty Shell	1.006	1.083	0.875	1.216
Allowance	2.312 2.000	2.271 2.000	2.203 2.000	2.341 2.000
Bad Kernels	0.312 0.440	0.271 0.443	0.203 0.425	0.341 0.275
Exceptional Allowance	—	—	—	—
Total	0.752	0.714	0.628	0.616

Locusts.

The Desert Locust (*Schistocerca gregaria*) which first appeared here from French Senegal in January 1931 continued to invade the Protectorate throughout the year in large swarms and it was found impractical to deal with them. On two occasions large swarms crossed the river and settled in the town of Bathurst where they rested for a few hours before passing on in a South West direction.

As in the previous year—when *Locusta migratoriodes* was the species invading the Colony—our energies were devoted entirely to the destruction of hoppers as they appeared from time to time in the various districts. It is satisfactory to be able to report that the means of control adopted were successful and no serious damage was caused to the crops although individual rice and corn farms suffered some damage in various localities.

Owing to very limited financial resources our methods of control were confined to poison baits and sprays, tin barriers made from kerosine tins, and driving the hoppers into open trenches where they could be buried or driving them into dry bush wood where they could be destroyed by fire.

Ploughing Trials.

The "Multiculteur Beauvais" light plough made by Messrs. Beauvais & Robin, France has continued to give good results both in the preparation of the land and in cultivation of groundnuts and guinea corn. This implement has a curved beam with several holes for the axle, giving a fair range over which the depth of cultivation can be carried out. There are attachments with the frames, consisting of a single-furrow plough, a ridging plough, tines and hoes. This implement can be easily drawn by a small donkey or by two men. Eight of these implements are being used on farms in the Protectorate and twenty-four more have been ordered.

This plough is admirably suited to the sandy soils forming the groundnut and guinea corn zone which are easily worked by light implements drawn by donkeys.

Donkeys are plentiful in the Colony but up to now have been used solely for the transport of the crop during the months of December and March. During the planting season May to July they remain idle.

They are therefore available for use in the tillage of the land during this period. They are quickly broken in and are easy to handle.

One important advantage of this light plough—in the present stage of the education of the African farmer—is that it can be easily lifted when a tree stump is encountered. The African farmer has not yet realised the necessity for, nor the advantage of, clearing his land of roots and stumps. Another advantage is that it teaches him the use of animals in actual farm work. This plough is likely to become far more popular here, as in Senegal, than the heavier and more expensive ox-drawn plough.

Working in co-operation with Messrs. Maurel Freres, Agents for this plough, practical demonstrations of these ploughs drawn by donkeys were given in Bathurst, Sukuta, Gunjur and Cape St. Mary. These demonstrations were attended by His Excellency the Governor and leading officials, and by the Chiefs and farmers of the districts.

Arrangements were approved early in the year for the purchase of six oxen and the erection of housing accommodation at Wuli Agricultural Station. These animals are to be used in ploughing the heavier lands at Wuli farm and to demonstrate their use in farm work. Owing to the outbreak of Rinderpest in the district it has been necessary to postpone the purchase of these cattle for the present.

Cattle Disease.

Rinderpest is still present in the Protectorate and continues to take a steady toll of cattle exceeding 5,000 head per annum.

Mr. R. E. Montgomery, M.R.C.V.S., Adviser on Animal Health, to the Secretary of State for the Colonies paid a recent visit to the Colony. After touring the Protectorate and discussing with the Chiefs, Commissioners and Agricultural officers various matters relating to the cattle industry. Mr. Montgomery has submitted definite proposals to the Government for the effective immunising of the whole of the cattle against Rinderpest. These proposals are now receiving the serious consideration of the Government and it is hoped that it will be possible to give practical effect to them in the near future and so end this serious economic loss to the agriculture of the Colony.

Virus Diseases of Groundnuts.

Rosette disease of groundnuts in the Gambia was first recorded by the writer in August 1923. Field investigations were commenced the following year to determine definite factors in connexion with this disease to enable suitable methods of control to be devised as it was evident this disease was capable of very material damage to the crop. Up to the present it has been possible to continue these investigations without a break and I am pleased to be able to record that definite progress has been made in this work. We have determined :—(*a*) Infection is not carried by seed ; this being a vital point as the crop is grown from seed each year. (*b*) The percentage of infection is greatly increased during periods of drought. (*c*) Infection is carried over from year to year by the germination of groundnuts left in the ground after reaping. (*d*) Control cannot be obtained by the eradication of these self-sown groundnuts as numerous plants have recently been collected showing the typical symptoms of the disease.

These include many garden plants such as petunias, vinca, calliopsis, calendulas and trees such as Star apple and Lagerstromias. (*e*) The most susceptible period of infection is July and August, and our field trials both in the lower and upper river have definitely proved that early sowings in May and June become less infected than later sowings. (*f*) Field experiments have proved that the yield per acre is considerably reduced when virus disease is present. In one large plot the reduction in yield was as great as 66 per cent. Another native farm approximately 6 acres was so severely infected that less than four bushels of nuts were harvested. (*h*) Virus disease considerably increases the percentage of shell and this is of importance as the percentage of shell in all cargoes is fixed by "The Incorporated Oil Seed Association for Fixing Allowances on West African Groundnut in Shell" at 25 per cent of the entire nut, and any excess is taken as valueless and allowed to the Buyers. Our field experiments at Cape St. Mary have shown 24 per cent of shell in "Unaffected Nuts", 45 per cent in "Slightly affected" and 57 per cent in "Badly affected". This means a very serious monetary loss to the seller.

(*i*) We have conclusively proved that close planting does significantly reduce virus infection. It is, however, undesirable to sow too closely as it wastes seed and does not give the individual plant room for ultimate spread. It is, however, essential in so far as reduction of virus infection is concerned to get the ground covered in as quickly as possible and Dr. Storey in his report to the Government of Uganda recommends mulching with dry grass. While this is possible in Experimental Stations it is a practice not likely to be followed generally by the native farmer in the Gambia as it would entail a good deal of extra labour without any apparent and immediate return. This Department is therefore devoting its attention to the finding of a quick growing and early maturing introduced cereal crop which can be inter-sown between the rows of groundnuts and which will be harvested before the groundnuts have fully covered in. This inter-cropping would probably prove a more effective check to the movements of the vector, and also provide an early and additional food crop to the farmer.

Where the extreme spacing was adopted 3 ft. x 3 ft. and the plot *kept free from weeds* 73 per cent of the plants were infected by virus. Where the same spacing was used and *weeds permitted to grow* the percentage of infection was nil.

This experiment was conducted without regard to yield and could not be recommended for general practice as the yield would be too low.

With more normal spacings and an inter-crop of cereal it is most probable that these satisfactory results will be obtained.

(*j*) Our work in raising new varieties resistant to this disease is progressing satisfactorily and good results have been obtained.

In 1922, I selected groundnut seed from vigorous plants growing on a native farm at Basse for the purpose of seed selection. As the Department was not then established I arranged with Col. Wannell, Commissioner to have these seeds grown and the resultant crop handed over to me, and this formed our first variety which I named "Basse". This variety gave a yield of 2,832 lbs per acre in 1924 and was reported upon by the Imperial Institute as follows:—78 per cent Kernel, 22 per cent Shell, 51.8 per cent Oil, 0.49 F. F. A. The standard groundnut is 75 per cent Kernel, 25 per cent Shell, 36 per cent Oil, 2.0 F. F. A. This variety still remains one of our best seed varieties and continue to show marked tolerance to virus disease.

In 1924, a ton of groundnut seed was imported from the Philippine Islands, the variety being "Tennesse Red", from the progeny of this I isolated two varieties which I named "Philippine Pink" and "Philippine White". These upon examination by the Imperial Institute proved to be valuable commercial varieties and were reported as follows .—

Variety.	Kernels.	Shell.	Oil.	F. F. A.
Philippine Pink	76 per cent	24 per cent	50.9 per cent	0.15 per cent
Philippine White	75 per cent	25 per cent	52.4 per cent	0.65 per cent

The parent variety was of trailing habit. Philippine Pink is of erect habit, and Philippine White is of trailing habit.

Philippine Pink has proved to be the most resistant variety to virus diseases yet found and continues to give satisfactory results. In 1927, when all other varieties were heavily infected, Philippine Pink remained unaffected throughout. Large quantities of this seed have been raised at our seed farms and distributed throughout the Protectorate. The progeny of this seed is to be found in the crop purchased at every buying station.

Applications for seed of this variety have been received from, and supplied to, the following Agricultural Departments abroad :— South Africa, Uganda, Washington, Nigeria, Gold Coast, Sierra Leone, French Senegal and to the Firestone Company, Liberia.

There are 45 varieties under investigation by this Department. Hybridisation Work and Botanical Studies were commenced by Mr. T. R. Hayes at Wuli last year with a view to obtaining segregate with more favourable qualities than the parents, with special reference to virus disease. By crossing Philippine Pink with various trailing types, it was hoped to obtain a type with the resistance of the former and with the habit of the latter. Also by combining two hairy types, an increase in hairiness may be obtained which would make it more difficult for the insect vector to infect the plant, as this hairiness may prove to be a protective feature of the plant. The "Poona" variety introduced from India has proved to be the most hairy variety yet found.

(*k*) Our early experiments to determine if the natural resistance of the plant to resist disease could be increased by chemical fertilizers to such a degree as to enable the plant to withstand the virus attack were not conclusive, but tended to show that under certain soil conditions beneficial effects could be obtained.

(*l*) It was known that the vector of this disease in South Africa and Uganda was Aphis leguminosae and diligent search has been maintained for this Aphid in the Gambia and although numerous insects have been collected and determined from year to year this Aphid had not been recorded until March this year when a

number of Aphids were collected by the writer on a group of self-sown groundnuts on a native farm at Serekunda. These were forwarded to the Imperial Institute of Entomology where they have been identified as Aphis laburni, Kalt. (*leguminosae Theo.*)

The vector in this Colony is therefore the same as in South and East Africa.

Two or More Types of Virus Diseases.

During the last two seasons our investigations have led us to believe there are at least two distinct types of virus at work in groundnuts in this Colony.

One of which produces chlorosis of the leaves and the other which produces the characteristics of the rosette type but without chlorosis. Plants infected with each type were grafted together and 21 days later the chlorosis rosette appeared in the green rosette type and the green rosette virus appeared in the chlorosis type 22 days later. This is regarded as sufficient evidence that at least two separate and distinct types of virus are present in this Colony.

The economic importance of these investigations is apparent when it is realised that *the whole prosperity of the entire community depends entirely upon the quantity of groundnuts raised and exported each year, and more important still is the fact that should this crop fail there is no other export crop to replace it at present.*

I desire to record that as there are no qualified Mycologists or Entomologists on the staff of this Department these investigations could not have been successfully undertaken without the valuable and continuous assistance rendered by Dr. E. J. Butler, Director of the Imperial Mycological Institute, and Sir Guy Marshall, Director Imperial Institute of Entomology. The small grants made by this Colony to these institutes is money well spent.

Distribution of Economic Plants.

The steady supply of economic plants has been maintained and the distribution for the last three years is as follows:—

Year.	Bathurst.	Protectorate.	Total.
1929	2,599	3,722	6,326
1930	2,228	2,036	4,264
1931	2,534	3,350	5,884

These consist chiefly of Grape Fruit, Washington Navel Oranges, Sapodillas, Sour Sops, Custard Apples, Avocado Pears, Julie Mangoes, Bananas, Tangarines and Mandarines, etc.

Sukuta Farm:—Steady progress is being maintained in planting this farm with fruit trees for the purpose of supplying plant material for propagation and to stimulate fruit growing in this district.

Expenditure:—Owing to the necessity for stringent economy the "Labour" vote was reduced from £1,600 to £630. This has been allocated as follows :— Wuli Farm £400, Sukuta Farm £50, Raising and Distribution of Economic Plants £150, Cape St. Mary £30.

Revenue :—Receipts from sale of Seeds and Plants amounted to £61 17*s.* 6*d.*

METEOROLOGY.

Rainfall :—The total rainfall for the year was 30.59 inches this being 17.27 inches less than the previous year and is the lowest recorded since 1913 when 23.68 inches were recorded.

Temperature :—The mean maximum temperature for the year was 89.1° being 0.7° higher than the previous year. The mean minimum shade temperature was 70.3°, being 0.9° above that of the previous year. The hottest month was October when the mean temperature was 85.1°. The extreme maximum shade temperature recorded was 100° on 4th March, and the mean minimum shade temperature was 54° on 23rd January.

Humidity :—The mean relative humidity was 65.2 per cent being 1.3 per cent above that of 1930.

The monthly mean range being 42 per cent in December to 95 per cent in October.

ARCHIBALD J. BROOKS,
Director.

10th June, 1932.

ANNUAL REPORT.

Wuli Farm, 1931.

Mr. T. R. Hayes was in charge of this farm throughout the growing season and Mr. F. W. Hall, Assistant Director assumed charge upon Mr. Hayes' transfer to Uganda in January 1932, and submitted the following report.

This farm was enlarged during the year and now the area available for work is 100 acres. About 30 acres were under crops during the year,

METEOROLOGICAL DATA.

The essential months only are given.

	Average Max. Temp. F.	Average Min. Temp. F.	Average Humidity 9 a.m.	Rainfall in inches.	No. of days Rain.
May ...	102	77	52	2.33	3
June ...	94	75	56	4.93	10
July ...	88	74	79	5.84	9
August ...	90	76	79	5.90	11
September ...	88	73	83	8.28	15
October ...	93	73	68	1.79	2
November ...	96	64	54	0.03	1
				29.10	51

The rainfall was much below average for the Upper River with the result generally that crops were somewhat light.

Groundnut Variety and Spacing Trial.

This experiment was slightly altered from last year. It was found in 1930 that Philippine Pink on the average required two-thirds the spacing of the runner varieties and this was adopted for 1931 as under.

Planting Distances (in inches).

	Philippine Pink.	Three Runners.
Widest	9 x 9	24 x 9
Wide	12 x 6	18 x 6
Narrow	9 x 6	12 x 6
Narrowest	6 x 6	9 x 6

The runner varieties used were Philippine White, Basse and Gambian. The 16 treatments were arranged at random in 6 randomised blocks.

The only yield result of value is given below.

Average Yield per acre in cwt.	Philippine Pink.	Philippine White.	Basse.	Gambian.	Mean.	S. E.
	14.74	13.18	11.79	11.88	12.92	0.45
%	114.	102.	91.	92.	100.	3.49

Philippine Pink is significantly superior to all others and Philippine White superior to Basse.

Groundnut Sowing Date and Variety Trial.

Four sowing dates at intervals of as near 14 days as weather conditions permitted, commencing June 18th. Four varieties were used, Philippine White, Coniaji, Basse and Gambian. The 16 treatments were arranged at random in 6 randomised blocks.

The following yield results are the only ones of significant value.

Variety Yield per acre in cwt.	Philippine White.	Coniaji,	Basse.	Gambian.	Mean.	S. E.
	11.7	9.99	10.62	9.36	10.26	0.42
%	107.9	97.4	103.5	91.2	100	4.09

Gambian is inferior to Basse and Philippine White.

Sowing date Yield per acre in cwts.	18th June.	2nd July.	19th July.	4th August.	Mean.	S. E.
	23.77	18.29	13.59	5.98	10.26	0.42
%	231.7	178.2	132.4	58.3	100	4.09

The superiority of the earlier sowings is very significant and supports previous results obtained in 1930.

Mixed Cropping Trial.

The basic crop was groundnuts and the intercrop used bulrush millet.

There were 4 treatments as follows :—

A. Groundnuts alone (control)

B. do. interplanted every 6th lines with millet.

C. do. do. do. 3rd „ „ „

D. do. do. do. line „ „

The experiment was laid out in Latin square.

Yield results were as follows.

Average Yield per acre in cwt.	A.	B.	C.	D.	Mean.	S. E.
	16.52	13.66	13.97	11.34.	13.87.	0.78
%	119.2	98.5	100.7	81.7	100	5.6
Bulrush millet in lbs.	—	92.5	97.5	152.5		

The groundnut yield is significantly greater with no intercrop.

If reduced to cash values with groundnuts at say 2/6d for 28 lbs. and the same quantity of millet for 1/4d the following returns are made.

Gross cash value of total crop per acre.	A.	B.	C.	D.	
£	8.26	7.05	7.22	6.03	

The indications are that to intercrop with bulrush millet will not pay.

Ridged V. Flat Cultivation.

This experiment which was to test the two methods of groundnut cultivation in the Gambia produced no significant differences, the variation between the yields of the two treatments being less than the standard error.

Uniformity Trial.

This was laid down for the purpose of finding out roughly the fertility gradient and smallest sized plots for groundnut experiments. The fertility gradient in the particular area was found to be E. to W. Plots 1/80 acre in area, twice as long as broad with the length E. to W. gave a sufficiently low per cent standard error. 8 replications are desirable if a Latin Square is not practicable.

27 Variety Trial.

This experiment was altered to obtain information with regard to the percentage of the crop which fell within a definite area in relation to the centre of the plant.

The spacing adopted was 3′ x 3′ to allow of, as far as practicable unrestricted growth.

The varieties were replicated 8 times.

When the plants reached maturity a few from each plot were carefully uprooted. They were reversed on the ground and a wire frame consisting of circles 3″ apart commencing with a radius of 3″ and ending with 15″ placed over the roots. All the nuts falling within the individual circles were harvested separately. Owing to the magnitude of the work it was only possible to so treat, in all, 600 plants. The resulting information was reduced to percentages.

Yields for plots were also recorded and these used as a basis for all the calculations in Cols. 14 – 17 inclusive of the following table.

It is sufficient to say here briefly that with regard to the varieties the theoretical yields are reasonable, those for bunch varieties not.

These figures however will be useful in the examination of future trials.

The premier position of Gambian is interesting. The quantity of seed deducted in Cols. 19 – 27 inclusive have been based on the estimate that 2′ x 9″ spacing requires 1 cwt. of seednuts per acre.

No.	Variety.	Actual yield per acre lbs.	Percentage of crop within circle given, measurement taken from centre of plant.										Calculated yield within circle given lbs.					Theoretical nett yield if spacing adopted had been as below instead of 3″ x 3″ in lbs. These figures are calculated from the actual yields and the quantity of seed used deducted afterwards.					Percentage nett increase which may be expected at the spacing given based on actual yields at 3″x3″ and seed deducted.			
			Runner.					Bunch.					Runner per 0-6′	6″-9″	9″-12″	12′-15″	15″-									
			0-6′	6′-9″	9″-12″	12″-15″	15″-	0-3″	3″-6″	6″-9″	9″-12″	12″-	Bunch 0-3″	3″-6″	6″-9″	9″-12″	12″-	¾″x6′	1″x1″	1½″x1½″	2″x2″	2½″x2½″	6″x6″	1″x1″	1½″x1½″	2″x2″
16	Gambian	827	27	20	20	17	16	—	—	—	—	—	223	165	165	141	133	—	1,839	1,485	1,199	971	—	128	84	48
2	Imported American	807	25	20	19	16	20	—	—	—	—	—	262	161	153	129	162	—	1,650	1,385	1,115	900	—	169	76	41
3	Falcon	766	23	18	19	17	20	—	—	—	—	—	199	138	145	139	154	—	1,623	1,281	1,025	853	—	117	71	37
18	Virginia Runner ...	746	24	20	19	19	18	—	—	—	—	—	179	149	142	142	134	—	1,442	1,245	1,013	853	—	98	71	39
19	Big Japan	746	22	17	18	18	25	—	—	—	—	—	164	127	134	134	187	—	1,308	1,097	912	777	—	80	51	26
10	Mauritius	706	28	21	21	16	14	—	—	—	—	—	198	148	148	113	99	—	1,611	1,317	1,066	836	—	135	91	55
6	Coniajé	686	24	20	19	17	20	—	—	—	—	—	165	137	130	117	137	—	1,317	1,141	927	762	—	98	71	39
5	Baol	665	30	22	16	15	17	—	—	—	—	—	230	146	106	100	113	—	1,632	1,141	972	766	—	152	77	50
24	Pondicherry ...	665	24	23	20	17	16	—	—	—	—	—	169	153	133	113	106	—	1,272	1,185	959	777	—	97	83	48
25	Barbados	645	22	20	21	18	19	—	—	—	—	—	142	129	135	116	123	—	1,110	1,017	868	723	—	77	62	39
11	Senegal	625	25	24	18	16	17	—	—	—	—	—	175	156	117	109	106	—	1,230	1,157	898	719	—	104	91	48
17	Basse	625	26	19	17	19	19	—	—	—	—	—	182	119	106	119	119	—	1,290	1,057	826	700	—	113	74	36
12	West African ...	605	24	21	20	18	17	—	—	—	—	—	165	127	121	103	109	—	1,137	1,021	839	686	—	94	74	43
15	Big Japanese ...	605	28	20	20	15	17	—	—	—	—	—	169	121	121	91	103	—	1,353	1,093	879	695	—	131	87	50
9	Philippine White ...	585	24	25	22	17	14	—	—	—	—	—	140	135	129	99	82	—	1,092	1,043	864	695	—	93	84	53
20	Spanish Bunch ...	585	—	—	—	—	—	37	22	17	15	9	217	129	99	88	52	7,140	2,246	1,713	1,155	—	1,163	420	202	104
4	Poona Local ...	565	—	—	—	—	—	35	18	21	16	10	198	102	119	90	56	6,456	2,532	1,609	1,100	—	1,089	353	194	101
14	Zaria	565	24	21	20	16	19	—	—	—	—	—	176	119	113	90	107	—	1,056	953	773	631	—	74	74	41
22	St. Vincent ...	565	27	19	19	15	20	—	—	—	—	—	153	107	107	85	113	—	1,209	973	786	625	—	122	78	43
26	Jumbo	565	25	20	19	20	16	—	—	—	—	—	141	113	107	113	91	—	1,105	949	768	651	—	102	74	41
1	Madagascar ...	544	27	20	18	16	19	—	—	—	—	—	147	109	98	87	103	—	1,155	957	751	597	—	120	82	43
13	Sine	543	28	19	21	18	15	—	—	—	—	—	152	103	109	98	89	—	1,296	953	771	637	—	128	81	47
21	Spanish Poona ...	543	—	—	—	—	—	36	17	19	17	11	123	92	104	92	69	6,384	2,424	1,501	1,044	—	1,116	361	186	99
8	Spanish No. 10 ...	524	—	—	—	—	—	37	19	21	11	9	194	100	110	73	47	6,312	2,178	1,549	1,028	—	1,150	390	203	103
23	Mauritius Local ...	504	17	13	16	17	34	—	—	—	—	—	86	80	81	86	141	—	606	597	511	451	—	25	23	5
27	Spanish No. 8 ...	484	—	—	—	—	—	34	19	20	15	11	164	92	97	78	53	5,232	2,136	1,345	924	—	1,102	359	185	99
7	Virginia Bunch ...	424	—	—	—	—	—	38	25	21	11	5	161	106	89	47	21	5,124	2,235	1,357	861	—	1,164	452	232	112
	Mean	619	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
	S. E.	74	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
	Means Runner ...	647	25	20	19	17	19	—	—	—	—	—	162	129	123	110	123	—	1,290	1,097	886	726	—	165	75	41
	Means Bunch ...	521	—	—	—	—	—	36	20	20	15	9	188	104	104	78	47	6,096	2,460	1,517	1,021	—	1,114	390	202	103

ROSETTE.

27 Variety Trial.

Results were not significant.

Sowing Date and Variety Trial.

The following significant information was obtained.

Variety No. affected with Rosette.	Gambian.	Basse.	Philipine White.	Conaiji.	Mean.	S. E.
	13.17	10.21	7.67	10.33	10.34	1.23
%	127.4	98.8	74.2	99.9	100	11.9

Indications that Gambian is more susceptible and Philippine White somewhat resistant.

Sowing Date No. affected with Rosette.	18th June	2nd July.	19th July	4th August.	Mean.	S. E.
	0.5	3.12	10.21	27.54	10.34	1.23
%	4.8	30.2	98.8	266.3	100	11.9

Progressively more susceptible after July 2nd sowing.

Spacing and Variety Trial.

Rosette data as follows:—

Spacing No. affected with Rosette.	Runner. 24″ x 9″	18″ x 9″	12″ x9″	9″ x 6″	Mean.	S. E.
	Bunch 12″ x 12″	12″ x 9″	12″ x 6″	6″x 6″		
	5.08	4.71	1.04	0.08	2.73	1.09
	186.3	172.6	38.1	2.9	100	39.5

The two closest spacings definitely superior to wider spacings.

Rosette Experiment.

This experiment was laid down solely for the purpose of obtaining information regarding conditions that affect the incidence of rosette. From previous experiments carried out at Cape St. Mary and Wuli it appeared fairly evident that spacing, which in some cases precluded obtaining a complete cover, and sowing date which had a similar effect, gave evidence of a higher degree of infection where the cover was incomplete.

Two spacings were adopted 3′ x 3′ and 6″ x 6″ repeated 8 times. Four plots of each spacing were weeded and four not, giving in all 4 treatments.

The two outside rows of the 6″ x 6″ plants were discarded in the counts, which was not necessary for the 3′ x 3′ as this was the space between plots.

The actual stands were recorded, the number diseased and percentages worked out. As far as possible when sowing, the weeds in weedy plots were untouched.

The results obtained are as under.

Average percentage of plants infected with Rosette.	6″ x 6′ Clean Weeded.	6″ x 6″ Weedy.	3′ x 3′ Clean Weeded.	3′ x 3″ Weedy.	Mean.	S. E.
	5.5	1.75	73.0	—	20.06	2.8
%	27	9	364	—	100	14

The result show definitely that close spacing with or without weeds and wide spacing left weedy reduce the incidence of the disease. There is no significant difference between the treatments under close spacing but it is recorded that the weed population was rather heavily reduced when planting the weedy plots, and, as sowing was done rather late in the season, the weeds had no opportunity to re-establish themselves to compare favourably with the quantity in the weedy 3′ x 3′ plots.

From the above it may be gathered that close spacing should be adopted, or, if owing to ridging the spacing has to be fairly wide, then an intercrop which will shade the unoccupied soil is necessary.

It is extremely doubtful if the local farmer allows weeds to grow for the above reason. Probably the main reasons for weedy farms are, laziness in many cases, and in others that extra weedings do not show any appreciable increase in yields for the labour involved. The latter is worthy of investigation, though the ideal under such condition is to find a suitable food crop to replace the weeds as a secondary cover.

GROUNDNUTS SELECTION WORK.

A number of selections of Philippine White, Philippine Pink, Basse and Gambian were tested against controls, and results in every case are not significant. The number of selections have been reduced for the 1932 season.

Experiments to test if by using seed from one, two or three seeded nuts yields would be effected gave nil results. It would appear that apart from selecting sound seed for sowing there would be no advantage in picking out nuts containing any particular number of seeds.

F 2 groundnut crosses were grown and further crosses made during the year.

Other Crops.

Cotton. Selection work was carried out with native cotton, and some Cambodia cotton, received from India, was grown for increase.

Maize. Native maize selection were made for further trial.

Sweet Potatoes. Imported varieties were tested against local and yields gave no significant difference. The local on the whole appeared to be less susceptible to insect attack. The average yield was approximately 6 tons to the acre.

Increase Work. Maize selections of 1930 were grown for increase.

Local and Introduced guinea corns, bulrush millets, ragi, legumes from Nigeria and India, Pigeon Pea from India, and small millets (Fanicum spp) were also grown and a few selections made.

Local rices of pure lines also received attention.